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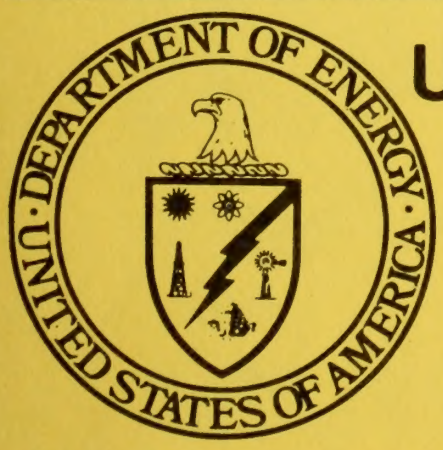
SOLAR/1012-78/10

Monthly Performance Report

J. D. EVANS

HOUSE A

OCTOBER 1978



U.S. Department of Energy

National Solar Heating and Cooling Demonstration Program

National Solar Data Program

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MONTHLY PERFORMANCE REPORT

J. D. EVANS, INC.
HOUSE A

OCTOBER 1978

I. SYSTEM DESCRIPTION

J. D. Evans, House A is one of two instrumented single-family residences in Columbia, Maryland. The home has approximately 2250 square feet of conditioned space. Solar energy is used for space heating the home and preheating domestic hot water (DHW). The solar energy system has an array of flat-plate collectors with a gross area of 350 square feet. The array faces south at an angle of 45 degrees to the horizontal. Water is the transfer medium that delivers solar energy from the collector array to storage and to the space heating and hot water loads. Solar energy is stored in the basement in a 1000-gallon steel storage tank. Incoming city water is preheated in a liquid-to-liquid heat exchanger located in the storage tank and then flows into a conventional 40-gallon DHW tank. When solar energy is insufficient to satisfy the space heating load, a heat exchanger within a heat pump and an electrical heating element in the air-distribution duct provides auxiliary energy for space heating. Similarly, an electrical heating element in the DHW tank provides auxiliary energy for water heating. The system, shown schematically in Figure 1, has three modes of solar operation.

Mode 1 - Collector-to-Storage: This mode activates when the temperature difference between the storage tank and the collector outlet is greater than 15°F. Water circulates from the storage tank through the collector until a temperature difference of less than 5°F is reached.

Mode 2 - Storage-to-Space Heating: This mode activates when thermal energy for space heating is requested by the room thermostat. Solar-heated water from storage circulates through a liquid-to-air heat exchanger in the space heating air duct. If solar energy is insufficient to satisfy the space heating load, the heat pump and/or the auxiliary electrical heating element will be activated. The electrical strip heater can also be manually operated without solar heating and heat pump operation.

Mode 3 - DHW Preheating: This mode is activated by drawing hot water from the system. Cold supply water is preheated in a liquid-to-liquid heat exchanger located in the solar energy storage tank before flowing to the DHW tank. If the required DHW tank temperature is not maintained by solar preheating, auxiliary energy is provided by the electrical heating element in the DHW tank.

II. PERFORMANCE EVALUATION

INTRODUCTION

The site was occupied in October and the solar energy system operated continuously during the month. Solar energy satisfied 90 percent of the DHW requirements

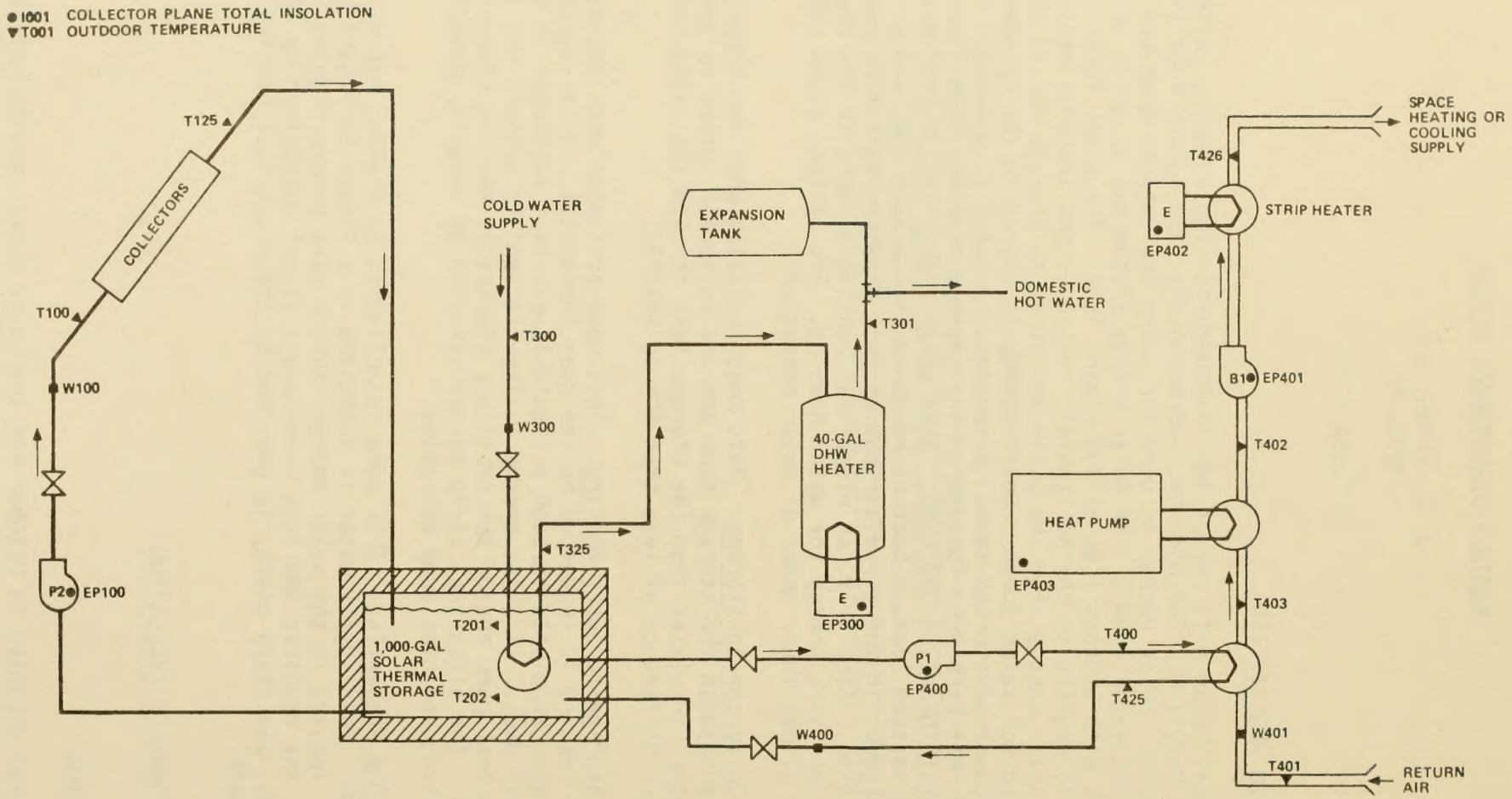

Figure 1. J. D. EVANS, INC., HOUSE A SOLAR ENERGY SYSTEM SCHEMATIC

and 100 percent of the space heating requirements. The solar energy system provided electrical energy savings of 0.9 million Btu. The site was serviced by IBM/Boeing and the site grantee from October 9 through October 14. Some data was collected on October 9; however, no data was collected from October 10 through October 14.

WEATHER CONDITIONS

During the month, total incident solar energy on the collector array was 16.2 million Btu for a daily average of 1493 Btu per square foot. This was below the estimated average daily solar radiation for this geographical area during October of 1545 Btu per square foot for a south-facing plane with a tilt of 45 degrees to the horizontal. The average ambient temperature during October was 51°F as compared with the long-term average for October of 57°F.

THERMAL PERFORMANCE

Collector - The total incident solar radiation on the collector array for the month of October was 16.2 million Btu. During the period the collector loop was operating, the total insolation amounted to 9.8 million Btu. The total collected solar energy for the month of October was 3.8 million Btu, resulting in a collector array efficiency of 24 percent, based on total incident insolation. Solar energy delivered from the collector array to storage was 3.8 million Btu. Operational energy required by the collector loop was 0.14 million Btu.

Storage - Solar energy delivered to storage was 3.8 million Btu. There were 1.3 million Btu delivered from storage to the DHW and space heating subsystems. Energy loss from storage was 2.6 million Btu. This loss represented 68 percent of the energy delivered to storage. The storage efficiency was 32 percent. This is calculated as the ratio of the sum of the energy removed from storage and the change in stored energy, to the energy delivered to storage. The average storage temperature for the month was 164°F.

DHW Load - The DHW subsystem consumed 0.79 million Btu of solar energy and 0.12 million Btu of auxiliary electrical energy to satisfy a hot water load of 0.56 million Btu. The solar fraction of this load was 90 percent. Losses from the DHW subsystem were 0.35 million Btu. The DHW subsystem did not consume any operational energy, resulting in an electrical energy savings of 0.79 million Btu. A daily average of 37 gallons of DHW were consumed at an average temperature of 135°F delivered from the tank.

Space Heating Load - The space heating subsystem consumed 0.52 million Btu of solar energy and no auxiliary energy to satisfy a space heating load of 0.52 million Btu. The solar fraction of this load was 100 percent. The space heating subsystem consumed a total of 0.027 million Btu of operating energy, resulting in an electrical energy savings of 0.24 million Btu. The average ambient temperature inside the house was 74°F.

OBSERVATIONS

The site was serviced between October 9 and October 14, during which period data transmission was interrupted.

ENERGY SAVINGS

The solar energy system provided a net electrical energy savings of 0.9 million Btu. The DHW subsystem provided an electrical energy savings of 0.79 million Btu. The space heating subsystem contributed an electrical energy savings of 0.24 million Btu.

III. ACTION STATUS

No action is required at this time.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

SITE/SYSTEM DESCRIPTION:
THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	16.202	MILLION BTU
	46293	BTU/SQ.FT.
COLLECTED SOLAR ENERGY	3.822	MILLION BTU
	10921	BTU/SQ.FT.
AVERAGE AMBIENT TEMPERATURE	51	DEGREES F
AVERAGE BUILDING TEMPERATURE	74	DEGREES F
ECSS SOLAR CONVERSION EFFICIENCY	0.08	
ECSS OPERATING ENERGY	0.140	MILLION BTU
TOTAL SYSTEM OPERATING ENERGY	0.187	MILLION BTU
TOTAL ENERGY CONSUMED	5.382	MILLION BTU

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.563	0.517	N.A.	1.109 MILLION BTU
SOLAR FRACTION	90	100	N.A.	* PERCENT
SOLAR ENERGY USED	0.791	0.517	N.A.	1.337 MILLION BTU
OPERATING ENERGY	N.A.	0.027	N.A.	0.187 MILLION BTU
AUX. THERMAL ENERGY	0.119	0.000	N.A.	0.119 MILLION BTU
AUX. ELECTRIC FUEL	0.119	0.000	N.A.	0.119 MILLION BTU
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. MILLION BTU
ELECTRICAL SAVINGS	0.791	0.237	N.A.	0.903 MILLION BTU
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. MILLION BTU

SYSTEM PERFORMANCE FACTOR: 1.088

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SITE SUMMARY

.SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

SITE/SYSTEM DESCRIPTION:
THE INSTALLATION CONSISTS OF TWO ADJACENT BUT SEPARATE RESIDENCES USING A SINGLE J-BOX AND SDAS. THE TWO HOUSES HAVE IDENTICAL AND INDEPENDENT SOLAR ASSISTED SYSTEMS. A LIQUID COLLECTOR TRANSFERS SOLAR HEAT TO A 1000 GALLON STORAGE TANK. A HEAT EXCHANGER IN THE STORAGE TANK PREHEATS DOMESTIC HOT WATER. STORAGE WATER IS CIRCULATED TO AN INDUCTIVE HEAT EXCHANGER FOR SPACE HEATING. RESISTANCE HEATING AND A HEAT PUMP, WHICH SUPPLIES SOME HEAT AND ALL COOLING, COMPLETE THE SYSTEM. ALL AUXILIARY ENERGY USED IS ELECTRIC.

GENERAL SITE DATA:

INCIDENT SOLAR ENERGY	17.093	GIGA JOULES
	525698	KJ/SQ.M.
COLLECTED SOLAR ENERGY	4.033	GIGA JOULES
	124017	KJ/SQ.M.
AVERAGE AMBIENT TEMPERATURE	11	DEGREES C
AVERAGE BUILDING TEMPERATURE	23	DEGREES C
ECSS SOLAR CONVERSION EFFICIENCY	0.08	
ECSS OPERATING ENERGY	0.148	GIGA JOULES
TOTAL SYSTEM OPERATING ENERGY	0.198	GIGA JOULES
TOTAL ENERGY CONSUMED	5.678	GIGA JOULES

SUBSYSTEM SUMMARY:

	HOT WATER	HEATING	COOLING	SYSTEM TOTAL
LOAD	0.594	0.545	N.A.	1.170 GIGA JOULES
SOLAR FRACTION	90	100	N.A.	* PERCENT
SOLAR ENERGY USED	0.835	0.545	N.A.	1.411 GIGA JOULES
OPERATING ENERGY	N.A.	0.028	N.A.	0.198 GIGA JOULES
AUX. THERMAL ENG	0.125	0.000	N.A.	0.125 GIGA JOULES
AUX. ELECTRIC FUEL	0.125	0.000	N.A.	0.125 GIGA JOULES
AUX. FOSSIL FUEL	N.A.	N.A.	N.A.	N.A. GIGA JOULES
ELECTRICAL SAVINGS	0.835	0.250	N.A.	0.953 GIGA JOULES
FOSSIL SAVINGS	N.A.	N.A.	N.A.	N.A. GIGA JOULES

SYSTEM PERFORMANCE FACTOR: 1.088

* DENOTES UNAVAILABLE DATA
@ DENOTES NULL DATA
N.A. DENOTES NOT APPLICABLE DATA

REFERENCE: USER'S GUIDE TO THE MONTHLY PERFORMANCE REPORT OF THE NATIONAL SOLAR DATA PROGRAM,FEBRUARY 28,1978, SOLAR/0004-78/18

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENERGY COLLECTION AND STORAGE SUBSYSTEM (ECSS)

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	AMBIENT TEMP DEG-F	ENERGY TO LOADS MILLION BTU	AUX THERMAL TO ECSS MILLION BTU	ECSS OPERATING ENERGY MILLION BTU	ECSS ENERGY REJECTED MILLION BTU	ECSS SOLAR CONVERSION EFFICIENCY
1	*	*	NOT APPLICABLE	NOT APPLICABLE	*	NOT APPLICABLE	*
2	0.666	58			0.007		0.111
3	0.418	53			0.005		0.203
4	0.282	58			0.002		0.248
5	0.072	57			0.000		1.151
6	0.678	58			0.006		0.083
7	0.667	51			0.003		0.149
8	0.298	44			0.000		0.184
9	0.622	43			0.006		*
10	*	*			*		*
11	*	*			*		*
12	*	*			*		*
13	*	*			*		*
14	*	*			*		*
15	0.635	44			0.004		0.050
16	0.140	45			0.000		0.984
17	0.363	46			0.002		0.249
18	0.561	46			0.007		0.164
19	0.249	54			0.002		0.222
20	0.671	52			0.009		0.026
21	0.724	51			0.008		0.080
22	0.659	57			0.008		0.044
23	0.521	62			0.005		0.000
24	0.729	44			0.007		0.000
25	0.686	49			0.005		0.000
26	0.234	65			0.000		0.001
27	0.722	51			0.006		0.000
28	0.656	47			0.006		0.000
29	0.647	49			0.006		0.000
30	0.478	48			0.002		0.000
31	0.689	50			0.007		0.000
SUM	16.202	-	N.A.	N.A.	0.140	N.A.	-
AVG	0.523	51	N.A.	N.A.	0.005	N.A.	0.083
NBS ID	Q001	N113			Q102		N111

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENCTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
COLLECTOR ARRAY PERFORMANCE

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

DAY OF MONTH	INCIDENT SOLAR ENERGY MILLION BTU	OPERATIONAL INCIDENT ENERGY MILLION BTU	COLLECTED SOLAR ENERGY MILLION BTU	DAYTIME AMBIENT TEMP DEG F	COLLECTOR ARRAY EFFICIENCY
1	*	*	*	*	*
2	0.666	0.452	0.057	*	0.086
3	0.418	0.321	0.050	*	0.120
4	0.282	0.085	0.010	*	0.037
5	0.072	0.000	0.000	60	0.000
6	0.678	0.475	0.107	63	0.158
7	0.667	0.276	0.063	57	0.095
8	0.298	0.000	0.000	*	0.000
9	0.622	0.490	0.155	*	0.249
10	*	*	*	*	*
11	*	*	*	*	*
12	*	*	*	*	*
13	*	*	*	*	*
14	*	*	*	*	*
15	0.635	0.304	0.146	53	0.229
16	0.140	0.000	0.000	53	0.000
17	0.363	0.164	0.104	53	0.287
18	0.561	0.414	0.193	57	0.344
19	0.249	0.100	0.056	58	0.225
20	0.671	0.550	0.274	60	0.408
21	0.724	0.570	0.275	66	0.380
22	0.659	0.513	0.271	73	0.412
23	0.521	0.322	0.155	76	0.298
24	0.729	0.515	0.204	50	0.279
25	0.686	0.411	0.131	58	0.192
26	0.234	0.000	0.000	69	0.000
27	0.722	0.482	0.193	56	0.267
28	0.656	0.404	0.150	60	0.229
29	0.647	0.425	0.163	59	0.253
30	0.478	0.119	0.117	55	0.245
31	0.689	0.496	0.206	59	0.300
SUM	16.202	9.782	3.822	-	-
AVG	0.523	0.316	0.123	60	0.236
NBSID	Q001		Q100		N100

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
STORAGE PERFORMANCE

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/1C
REPORT PERIOD: OCTOBER,1978

DAY OF MONTH	ENERGY TO STORAGE MILLION BTU	ENERGY FROM STORAGE MILLION BTU	CHANGE IN STORED ENERGY MILLION BTU	STORAGE AVERAGE TEMP DEG F	STORAGE EFFICIENCY
1	*	*	-0.060	*	*
2	0.057	0.074	-0.004	180	1.224
3	0.050	0.085	0.036	182	2.404
4	0.010	0.070	-0.050	181	1.890
5	0.000	0.083	-0.055	175	1.000
6	0.107	0.056	-0.002	170	0.505
7	0.063	0.099	-0.003	170	1.525
8	0.000	0.055	-0.078	166	1.000
9	0.155	*	0.021	156	*
10	*	*	*	*	*
11	*	*	*	*	*
12	*	*	*	*	*
13	*	*	*	*	*
14	*	*	*	*	*
15	0.146	0.032	0.043	166	0.510
16	0.000	0.138	-0.154	156	1.000
17	0.104	0.091	-0.044	141	0.442
18	0.193	0.092	-0.004	135	0.457
19	0.056	0.055	-0.073	133	-0.311
20	0.274	0.017	0.121	137	0.506
21	0.275	0.058	0.060	149	0.430
22	0.271	0.029	0.074	159	0.378
23	0.155	0.000	0.023	167	0.152
24	0.204	0.000	0.051	172	0.248
25	0.131	0.000	-0.004	176	-0.031
26	0.000	0.000	-0.054	173	1.000
27	0.193	0.000	0.028	169	0.145
28	0.150	0.000	0.020	173	0.133
29	0.163	0.000	0.018	175	0.112
30	0.117	0.000	-0.058	173	-0.494
31	0.206	0.000	0.040	171	0.197
SUM	3.822	1.337	-0.130	-	-
AVG	0.123	0.043	-0.004	164	0.316
NBS ID	Q200	Q201	Q202		N108

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
HOT WATER SUBSYSTEM

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

DAY OF MON.	HOT WATER LOAD MILLION BTU	SOLAR FR.OF LOAD PER CENT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	SUP. WAT. TEMP DEG F	HOT WAT. TEMP DEG F	HOT WATER USED GAL
1	*	*	*	NOT APPLICABLE	*	*	NOT APPLICABLE	*	NOT APPLICABLE	*	*	*
2	0.047	86	0.074		0.000	0.000		0.074		73	131	98
3	0.054	98	0.085		0.000	0.000		0.085		73	128	112
4	0.041	100	0.070		0.000	0.000		0.070		73	127	92
5	0.055	100	0.083		0.000	0.000		0.083		71	126	120
6	0.037	100	0.056		0.000	0.000		0.056		73	124	83
7	0.065	100	0.099		0.000	0.000		0.099		71	125	142
8	0.035	100	0.055		0.000	0.000		0.055		72	123	80
9	*	*	*		0.000	0.000		*		*	*	*
10	*	*	*		*	*		*		*	*	*
11	*	*	*		*	*		*		*	*	*
12	*	*	*		*	*		*		*	*	*
13	*	*	*		*	*		*		*	*	*
14	*	*	*		*	*		*		*	*	*
15	0.003	100	0.004		0.000	0.000		0.004		70	127	6
16	0.013	100	0.016		0.006	0.006		0.016		68	128	23
17	0.006	75	0.006		0.009	0.009		0.006		63	139	9
18	0.004	62	0.003		0.006	0.006		0.003		63	140	6
19	0.025	53	0.016		0.015	0.015		0.016		64	140	37
20	0.014	55	0.008		0.010	0.010		0.008		64	143	19
21	0.017	59	0.017		0.004	0.004		0.017		64	142	26
22	0.021	72	0.019		0.006	0.006		0.019		68	139	31
23	0.000	62	0.000		0.005	0.005		0.000		77	140	0
24	0.000	0	0.000		0.003	0.003		0.000		77	141	0
25	0.000	46	0.000		0.005	0.005		0.000		76	140	0
26	0.000	40	0.000		0.003	0.003		0.000		74	140	0
27	0.000	40	0.000		0.007	0.007		0.000		75	139	0
28	0.000	30	0.000		0.004	0.004		0.000		75	139	0
29	0.000	0	0.000		0.004	0.004		0.000		75	139	0
30	0.000	0	0.000		0.004	0.004		0.000		75	139	0
31	0.000	18	0.000		0.006	0.006		0.000		76	139	0
SUM	0.563	-	0.791	N.A.	0.119	0.119	N.A.	0.791	N.A.	-	-	1145
AVG	0.018	90	0.026	N.A.	0.004	0.004	N.A.	0.026	N.A.	71	135	37
NBS	Q302	N300	Q300	Q303	Q301	Q305	Q306	Q311	Q313	N305	N307	N308

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
SPACE HEATING SUBSYSTEM

SITE: J.D. EVANS, INC. HOUSE A, COLUMBIA, MARYLAND — SOLAR/1012-78/10
REPORT PERIOD: OCTOBER, 1978

DAY OF MON.	SPACE HEATING LOAD MILLION BTU	SOLAR FR.OF LOAD PCT	SOLAR ENERGY USED MILLION BTU	OPER ENERGY MILLION BTU	AUX THERMAL USED MILLION BTU	AUX ELECT FUEL MILLION BTU	AUX FOSSIL FUEL MILLION BTU	ELECT ENERGY SAVINGS MILLION BTU	FOSSIL ENERGY SAVINGS MILLION BTU	BLDG TEMP DEG. F	AMB TEMP DEG. F
1	*	*	*	*	*	*	NOT APPLICABLE	*	NOT APPLICABLE	*	*
2	0.000	0	0.000	*	0.000	0.000		0.000		81	58
3	0.000	0	0.000	*	0.000	0.000		0.000		79	53
4	0.000	0	0.000	*	0.000	0.000		0.000		80	58
5	0.000	0	0.000	*	0.000	0.000		0.000		82	57
6	0.000	0	0.000	*	0.000	0.000		0.000		82	58
7	0.000	0	0.000	*	0.000	0.000		-0.000		79	51
8	0.000	0	0.000	*	0.000	0.000		-0.000		80	44
9	-0.003	100	-0.003	*	0.000	0.000		-0.002		82	43
10	*	*	*	*	*	*		*		*	*
11	*	*	*	*	*	*		*		*	*
12	*	*	*	*	*	*		*		*	*
13	*	*	*	*	*	*		*		*	*
14	*	*	*	*	*	*		*		*	*
15	0.027	100	0.027	*	0.000	0.000		0.013		70	44
16	0.122	100	0.122	0.003	0.000	0.000		0.055		70	45
17	0.085	100	0.085	0.003	0.000	0.000		0.036		70	46
18	0.085	100	0.085	0.004	0.000	0.000		0.044		70	46
19	0.040	100	0.040	0.002	0.000	0.000		0.016		70	54
20	0.009	100	0.009	0.000	0.000	0.000		0.004		71	52
21	0.041	100	0.041	0.002	0.000	0.000		0.020		72	51
22	0.010	100	0.010	0.000	0.000	0.000		0.005		73	57
23	0.000	0	0.000	0.000	0.000	0.000		0.000		74	62
24	0.000	0	0.000	0.000	0.000	0.000		0.000		72	44
25	0.000	0	0.000	0.000	0.000	0.000		0.000		69	49
26	0.000	0	0.000	0.000	0.000	0.000		0.000		71	65
27	0.000	0	0.000	0.000	0.000	0.000		0.000		73	51
28	0.000	0	0.000	0.000	0.000	0.000		0.000		70	47
29	0.000	0	0.000	0.000	0.000	0.000		0.000		70	49
30	0.000	0	0.000	0.000	0.000	0.000		0.000		68	48
31	0.000	0	0.000	0.000	0.000	0.000		0.000		69	50
SUM	0.517	-	0.517	0.027	0.000	0.000	N.A.	0.237	N.A.	-	-
AVG	0.017	100	0.017	0.001	0.000	0.000	N.A.	0.008	N.A.	74	51
NBS	Q402	N400	Q400	Q403	Q401		Q410	Q415	Q417	N406	N113

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
ENVIRONMENTAL SUMMARY

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

DAY OF MONTH	TOTAL INSOLATION BTU/SQ.FT	DIFFUSE INSOLATION BTU/SQ.FT	AMBIENT TEMPERATURE DEG F	DAYTIME AMBIENT TEMP DEG F	RELATIVE HUMIDITY PERCENT	WIND DIRECTION DEGREES	WIND SPEED M.P.H.
1	*	N	*	*	N	N	N
2	1902	O	58	*	O	O	O
3	1193	T	53	*	T	T	T
4	806		58	*			
5	206	A	57	60	A	A	A
6	1936	P	58	63	P	P	P
7	1906	P	51	57	P	P	P
8	853	L	44	*	L	L	L
9	1777	I	43	*	I	I	I
10	*	C	*	*	C	C	C
11	*	A	*	*	A	A	A
12	*	B	*	*	B	B	B
13	*	L	*	*	L	L	L
14	*	E	*	*	E	E	E
15	1814		44	53			
16	401		45	53			
17	1038		46	53			
18	1604		46	57			
19	711		54	58			
20	1917		52	60			
21	2070		51	66			
22	1882		57	73			
23	1487		62	76			
24	2083		44	50			
25	1961		49	58			
26	669		65	69			
27	2062		51	56			
28	1874		47	60			
29	1848		49	59			
30	1366		48	55			
31	1968		50	59			
SUM	46293	N.A.	-	-	-	-	-
AVG	1493	N.A.	51	60	N.A.	N.A.	N.A.
NBS ID	Q001		N113			N115	N114

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.

SOLAR HEATING AND COOLING DEMONSTRATION PROGRAM

MONTHLY REPORT
THERMODYNAMIC CONVERSION EQUIPMENT

SITE: J.D. EVANS,INC. HOUSE A, COLUMBIA, MARYLAND SOLAR/1012-78/10
REPORT PERIOD: OCTOBER,1978

DAY OF MONTH	EQUIPMENT LOAD MILLION BTU	THERMAL ENERGY INPUT MILLION BTU	OPERATING ENERGY MILLION BTU	ENERGY REJECTED MILLION BTU	COEFFICIENT OF PERFORMANCE (SEE NOTE)
1	*	*	N	N	*
2	0.000	0.000	O	O	0.000
3	0.000	0.000	T	T	0.000
4	0.000	0.000			0.000
5	0.000	0.000	A	A	0.000
6	0.000	0.000	P	P	0.000
7	0.000	0.000	P	P	0.000
8	0.000	0.000	L	L	0.000
9	0.000	0.000	I	I	0.000
10	*	*	C	C	*
11	*	*	A	A	*
12	*	*	B	B	*
13	*	*	L	L	*
14	*	*	E	E	*
15	0.000	0.000			0.000
16	0.000	0.000			0.000
17	0.000	0.000			0.000
18	0.000	0.000			0.000
19	0.000	0.000			0.000
20	0.000	0.000			0.000
21	0.000	0.000			0.000
22	0.000	0.000			0.000
23	0.000	0.000			0.000
24	0.000	0.000			0.000
25	0.000	0.000			0.000
26	0.000	0.000			0.000
27	0.000	0.000			0.000
28	0.000	0.000			0.000
29	0.000	0.000			0.000
30	0.000	0.000			0.000
31	0.000	0.000			0.000
SUM	0.000	0.000	*	*	0.000
AVG	0.000	0.000	*	*	0.000

* DENOTES UNAVAILABLE DATA.
@ DENOTES NULL DATA.
N.A. DENOTES NOT APPLICABLE DATA.
NOTE:

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